The Forty-Ninth Annual Report

OF THE

UNIVERSITY OF MARYLAND

Agricultural Experiment Station

College Park, Prince George's County, Maryland

1935-1936

PUBLISHED BY THE STATION

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The University of Maryland Agricultural Experiment Station

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AGRICULTURAL ENGINEERING.

R. W. Carpenter, A.B., LL.B., Engineering.

AGRONOMY (CROPS AND SOILS).

†J. E. Metzger, B.S., A.M., Agronomist.
W. B. Kemp, Ph.D., Agron. (Genetics).
G. Eppley, M.S., Assoc. (Crops).
O. C. Bruce, M.S., Soil Technologist.
R. P. Thomas, Ph.D., Soil Technologist.
R. G. Rothgeb, Ph.D., Assoc. Plt. Breeding.
E. H. Schmidt, M.S., Assistant (Soils).
H. B. Winant, M.S., Assistant (Soils).
R. L. Sellman, B.S., Assistant.

ANIMAL AND DAIRY HUSBANDRY.

DeVoe Meade, Ph.D., Dairy and Animal Husbandman.
B. E. Carmichael, M.S., Animal Husbandman.
L. W. Ingham, M.S. (Dairy Husbandry).
M. H. Berry, M.S., Associate Dairy Husbandry.
H. L. Ayres, Dairy Mfg.
C. W. England, Ph.D., Assoc. (Dairy Mfg.).
Keith G. Acker, M.S., Asst. Animal Husbandman.
C. M. Mechan, M.S., Asst. Dairy Insp.

ANIMAL PATHOLOGY AND BACTERIOLOGY.

R. C. Reed, Ph.B., D.V.M., Pathologist.
A. L. Black, Ph.D., Bacteriologist.
J. E. Faber, M.S., Asst. Bacteriologist.
M. T. Bartram, Ph.D., Assistant.

BOTANY, PATHOLOGY, PHYSIOLOGY.

†† C. O. Appleman, Ph.D., Physiologist.
J. B. S. Norton, M.S., D.Sc., Pathologist.
C. E. Temple, M.S., Pathologist.
R. A. Jehle, Ph.D., Assoc. Pathologist.
Ronald Bamford, Ph.D., Assoc. Botanist.
Russell G. Brown, Ph.D., Asst. Physiologist.
Herman G. Du Buy, Ph.D., Asst. Physiologist.

ENTOMOLOGY.

E. N. Cory, Ph.D., Entomologist.
H. S. McConnell, M.S., Associate.
Geo. S. Langford, Ph.D., Associate.
L. P. Ditman, Ph.D., Assistant.
Geo. Abrams, M.S., Assistant (Bees).
C. Graham, M.S., Assistant.

HORTICULTURE.

A. L. Schrader, Ph.D., Act. Horticulturist.
T. H. White, M.S., Olericulturist and Floriculturist.
S. W. Wentworth, B.S., Associate Pomologist.
F. B. Lincoln, Ph.D., Assoc. Plant Propagation
H. B. Cordner, Ph.D., Associate Olericulturist.
W. A. Frazier, Ph.D., Assoc. Canning Crops.
Irvin C. Haut, Ph.D., Assoc. Pomologist.
J. B. Blandford, Asst. (Supt.).

LIVE STOCK SANITARY LABORATORY.

M. F. Welsh, B.S., D.V.M., State Veternarian.
A. L. Brueckner, B.S., V.M.D., Pathologist.
L. J. Poelma, D.V.M., M.S., Assoc. Pathologist.
H. M. DeVolt, D.V.M., M.S., Assoc. Pathologist. (Poultry).
C. L. Everson, D.V.M., Asst. Pathologist
C. R. Davis, M.S., D.V.M., Asst. Pathologist (Poultry).
Irwin Moulthorp, D.V.M., Asst. Pathologist (Poultry).
W. R. Teeter, B.S., D.V.M., Asst. Pathologist

POULTRY HUSBANDRY.

M. A. Jull, Ph.D., Poultry Husbandman.
R. H. Waite, B.S., Poultry Husbandman.
Geo. D. Quigley, B.S., Associate.

RIDGELY SUB-STATION.

Albert White, B.S., Superintendent.

SEED INSPECTION.

F. S. Holmes, M.S., Inspector.
Ellen Emack, Assistant Analyst.
Olive Kelk, Assistant Analyst.
Elizabeth Shank, Assistant.

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† Assistant Director.
†† Dean of Graduate School.

The Station is located on the B. & O. R. R., City and Suburban Electric Car Line and the Baltimore-Washington Boulevard, eight miles north of Washington, D. C. Bell Telephone—Berwyn Exchange.

Visitors will be welcome at all times, and will be given every opportunity to inspect the work of the Station in all its departments.

The Bulletins and Reports of the Station will be mailed free of charge, to all residents of the State who request them.

ADDRESS:
AGRICULTURAL EXPERIMENT STATION,
College Park, Maryland.

UNIVERSITY OF MARYLAND
AGRICULTURAL EXPERIMENT STATION

Volume 49 1935-36

THE FORTY-NINTH ANNUAL REPORT OF THE MARYLAND AGRICULTURAL EXPERIMENT STATION

For The Fiscal Year Ending June 30, 1936

BY H. J. PATTERSON, Director

To the Governor of Maryland, the Board of Regents, and the President of the University of Maryland:

In accordance with the provisions of the acts establishing the Agricultural Experiment Station, there is presented herewith a statement as to its work and activities, a summary of some of the results obtained, a list of the projects in progress together with a financial statement showing the receipts and expenditures for the fiscal year ending June 30, 1936. There is also appended copies of the nineteen bulletins issued during the year.

RESEARCH AND RESEARCH WORKERS

The Agricultural Experiment Station is the research agency of the state for the development and conservation of the land and soil. This is Maryland's greatest natural resource. The results obtained are the source of much of the reliable agricultural information disseminated for the use of farmers. The research program should be enlarged to include the water resources, also game, wild life and forest resources.

Results from research are usually procured only after long periods of patient, painstaking work and close attention to details. The research worker in many respects is much like the inventor. He shuns publicity until results are secured. Research deals with the unknown and requires frequent changes as the project progresses. The research worker who has the training and mind for discovering truth, new facts, solving farm problems, analyzing results, drawing proper conclusions and devising means for applying results should be encouraged by facilities for work and by compensation. The research scientist desires security and freedom for the exercise of initiative and ingenuity. He usually dislikes to make a show of science. It is difficult to find men trained for a particular piece of research and suited to the particular environment. It is frequently more satisfactory to train men for a definite job rather than secure them from some other place. It is often a mistake to give a successful research worker executive duties. Too often it results in a loss to research and the executive duties could be as well or better done by a man of different training and temperament.

The growth of research institutions and the number of new projects inaugurated by the Federal and State departments has made a large demand for workers and advanced salaries in some lines.

Salaries:

The College of Agriculture and the Experiment Station operate on a twelve-months basis. Most of the staff are on duty seven to eight hours per day, for six days per week and for eleven months per year. The scale of salaries paid now is from 20% to 40% below those paid by the U. S. Government for similar work. Consequently many of our men resign to accept positions in the U. S. Department of Agriculture.

The salaries paid in the College of Agriculture are actually lower than those paid for positions of a similar grade in other Colleges in the University where the requirements call for fewer hours per day, fewer days per week and at least two months less time per year. There should be some equalization if strong men are to be secured and held, and standards and quality of work be maintained and improved.

It would require an increase of at least $10,000 in the present budget to provide for the increases in salaries which should be made. To do the work which the various interests are demanding would require additions to the staff which would cost $15,000 to $20,000 per year for salaries.

Labor:

The budget for labor is very inadequate for the work to be done. The wages paid laborers are below those paid by the State, U. S. Government, Sanitary Commission and many private enterprises. The general level of wages should be advanced if competent and reliable labor is to be secured and held. Research work requires laborers above the average. The labor budget should be three or four times the present appropriation.

Maintenance:

The budget for supplies, printing, equipment and travel does not meet requirements. Many needs cannot be considered at all, many are deferred and others only partially cared for under present conditions. The maintenance budget should be at least twice as much as at present.

CHANGES IN STAFF

Resignations:

W. E. Hunt, M. S., Associate Animal Husbandman, who had a leave of absence for one year, resigned October 1, 1935, to accept a position with Schluderberg-Kurdle Company, meat packers of Baltimore.

Glenn A. Greathouse, Ph. D.; M. W. Parker, Ph. D.; and Neil W. Stuart, Ph. D., all Assistant Plant Physiologists, all resigned June 1, 1936, to accept positions in the U. S. Department of Agriculture Bureau of Plant Industry.

J. H. Beaumont, Ph. D., Horticulturist, resigned January 1, 1936, to accept a position on the research staff of the Hawaiian Experiment Station.

Appointments:

Keith S. Acker, M. S., Assistant in Animal Husbandry.
C. M. Mecham, M. S., Assistant in Dairy Inspection.
W. R. Teeter, D. V. M., Assistant in Animal Pathology.
J. C. Haut, Ph. D., Associate in Pomology.

Leave of Absence:

O. C. Bruce, M. S., has been given an indefinite leave of absence to direct the Federal Government Soil Erosion project in Maryland.

A. B. Hamilton, M. S., and W. Paul Walker have each been granted leaves of absence for short periods to conduct some special studies for the Federal and State Governments.

RESEARCH FACILITIES

The growth of the research work, new problems and demands make it very necessary to provide new and additional facilities. Some departments should be housed in safer and more sanitary buildings.

Land for Crop, Soil and Fertility Studies:

There is need for 50 to 100 acres of fairly level and uniform land near the University for some phases of crop tests, breeding and for soil and fertility studies. These of course must be supplemented by further tests on different types of soils and environments in different parts of the state. The rounding out of accomplishments in plant breeding needs considerable areas for the multiplication of new varieties so that the seed can be produced in sufficient quantities for general distribution to farmers.

Land for Poultry Plant:

The poultry department has been doing very valuable research on problems that could be conducted in the laboratory and with a limited area. The department is at a disadvantage in not having a larger and better equipped plant. A suitable location near the University should be secured so that it will be easily available for research workers, students and visitors. Poultry houses and laboratories for research are needed.

Live Stock Farms:

Two hundred and twenty-three acres have been secured at Piffers Corner, about 20 miles from the University, for live stock. This will provide for some kinds of work, but it is too far from the class rooms and laboratories to serve all interests to the best advantage. Barns and live stock laboratories for research are needed and must be supplied before the staff can render the services expected by the live stock industry.

Dairy Farm:

A portion of the Truan property has been assigned to the dairy department upon which to locate new barns, silos and stock-judging pavillion. The construction of these is now in progress. A contribution towards these buildings was made by the Federal Public Works Administration. Most of the labor has been from this County's relief rolls.

The Buckley Brothers farm of 212 acres has been secured and will be developed as a dairy farm. Only about one-fourth of the land is tillable now, the balance will need to be cleared of tree growth. This farm adjoins the University lands. The completion of the plans for the dairy farm will give this department a good equipment for both research and instruction. More money than is now available will be required to complete the project and maintain it on a scale commensurate with the importance of the dairy industry in Maryland.

Greenhouses:

More greenhouse space is needed by the Departments of Agronomy, Seed Inspection, Botany, Plant Pathology, Plant Physiology, Horticulture and Entomology. In many lines of research and plant breeding glass house facilities are essential and will enable as much to be done in one year as would require several years to accomplish without.

Summary of Needs:

1. Larger appropriations and better pay for labor.
2. More money for operating, travel and maintenance expenses for all departments, especially for seed inspection.
3. More money for printing bulletins and distributing results of research.
4. More money for equipment, apparatus, machinery, trucks and animals.
5. Appropriations for farm buildings, greenhouses, seed testing laboratories, seed curing and storage house, apiary, homes for labor near work.
6. Better salaries for research workers, teachers and clerical assistants.
7. Money to make additions to staff for new lines of work and enlarging some.
8. Research for conserving and developing water resources.
9. Research for conserving and developing game and wild life resources.
10. Additional research laboratories.
11. Laboratories and offices for Crop Reporting Service.
12. Laboratories and offices for Extension Service.

PUBLICATIONS

During the year there have been nineteen bulletins published and numerous contributions to scientific societies and journals. These give a good indication of the progress which has been made. More matter is ready for publication as soon as funds for printing are available.

Instead of sending the bulletins out promiscuously to a regular mailing list, there has been prepared an abstract or summary of the results given in each bulletin and this has been sent to all the papers published in Maryland and all agricultural papers. These abstracts and popular notices have been widely published and they have brought requests for the bulletins from an interested and appreciative class of readers. This plan of publicity and distribution has been fairly efficient and given an economical use of the printing fund. A repetition, extension and a variety of popular press notices might be desirable and increase efficiency.

The following is a list of the bulletins and papers published:

Bulletin Number	Title	Author	Pages	Copies Issued
378	A Survey of the Sheep Industry of Maryland	Wells E. Hunt	1-43	3,000
379	Fattening Thin Native Lambs	Wells E. Hunt	45-127	3,000
380	The Effect of Size and Type of Ewe on Efficiency of Production	Wells E. Hunt	129-153	3,000
381	Tax Delinquency in Maryland With Special Reference to Agriculture	W. P. Walker and A. B. Hamilton	155-185	3,500
382	Production, Marketing and Consumption of Maryland Tobacco	Ray Hurley and S. H. DeVault	187-289	3,500
383	Changes In The Chemical Composition of Green Snap Beans After Harvest	M. W. Parker and Neil W. Stuart	291-313	2,500
384	Wormseed Oil Production	G. S. Weiland, L. B. Broughton and J. E. Metzger	315-335	2,500
385	Broiler Production	Roy H. Waite	337-367	3,000
386	Effect of Fertilizer Treatments of a Soil on the Quality and Yield of Tomatoes	R. P. Thomas	369-389	2,500
387	Part I. The Effect of Bang's Disease on Milk Production Part II. Udder Infection in Bang's Disease	Alexander Gow, Jr., and A. B. Hamilton C. L. Everson, L. J. Poelma and A. L. Brueckner	391-400	2,500
388	Soft-Curd Milk Studies	M. H. Berry	401-420	2,500
389	Menhaden Oils as an Antirachitic Supplement for Poultry	W. C. Supplee and Charles F. Lee	421-426	2,500
390	An Economic Study of the Broiler Industry	P. R. Poffenberger, S. H. DeVault and A. B. Hamilton	427-463	3,000
391	The Relation of Physical Properties and Chemical Composition of Red Clover Plants to Winterhardiness	Glenn A. Greathouse and Neil W. Stuart	465-492	2,500
392	Blackhead (Infectious Enterohepatitis) In Turkeys, With Notes on Other Intestinal Protozoa	H. M. DeVolt and C. R. Davis	493-567	2,500
393	Factors Affecting the Properties and Stability of Whipping Cream	C. W. England and C. Marion Mecham	569-593	2,500
394	Sale of Dairy Products at Roadside Markets in Maryland	DeVoe Meade and Russell K. Mead	595-626	2,500
395	The Vaccination of Baby Chicks Against Fowl Pox	H. M. DeVolt, I. M. Moulthrop and C. R. Davis	627-633	3,000
396	Maryland Farm Credit Handbook	Ralph Russell	635-690	2,500

MIMEOGRAPHED REPORTS

The Mexican Bean Beetle	S. L. Crosthwaite
Agricultural Statistics for Maryland, by Counties, 1910 to 1935	A. B. Hamilton
The Assessment and Collection of Motor Vehicle Property Taxes in Maryland. Experiment Station Special Bulletin No. 2	W. P. Walker
The Retail Sales Tax. Maryland Agricultural Experiment Station Special Bulletin No. 1	W. P. Walker E. C. Weitzell

PAPERS CONTRIBUTED TO SOCIETIES AND JOURNALS

Anderson, E. J.—High Fertility Aids Control of Strawberry Root Rot. American Fruit Grower, 55: December, 1935.

Appleman, C. O.—Philosophical Aspects of Biological Research. Philosophical Society. University of Maryland, January 10, 1936.

Appleman, C. O. and Neil W. Stuart—Nitrogenous Metabolism in Irish Potatoes. American Society of Plant Physiology. St. Louis, December 30—January 4, 1936,

Bamford, Ronald—The Chromosome Number in Gladiolus. Journal of Agricultural Research, 51: November 15, 1935.

Bamford, Ronald—Chromosomes in Gladiolus. Maryland Gladiolus Society. February, 1936.

Bamford, Ronald—Pollination in Plants. Hyattsville Horticultural Society. March, 1936.

Bamford, Ronald—Chromosome Number and Hybridization in Gladiolus. University of Maryland Biological Society. May 19, 1936.

Bamford, Ronald—How Plants Grow. Kiwanis Club. June 11, 1936.

Bartram, M. T. and L. A. Black—Reaction of Escherichia, Aerobacter and Citerbacter Strains in Boric Acid and Hexamine Media. Journal of Bacteriology, 31: January, 1936.

Berry, M. H.—Variations in the Curd Tension of the Milk Throughout the Complete Lactation Period. Journal of Dairy Science, July, 1935.

Black, L. A. and Mary Elizabeth Klinger—A Comparison of Media for the Detection of Escherichia-Aerobacter. Journal of Bacteriology 31: February, 1936.

Brueckner, A. L. and L. J. Poelma—Horse Disease. Southern Maryland Horse Breeder's Association. August, 1935.

Carolus, R. L.—Floral Primordia Differentiation in Beet and Turnip. Proc. Amer. Soc. Hort. Sci., 32: 1935.

Cordner, H. B.—Recent Results on Vegetable Variety Trials in Maryland. Trans. Penin (Md.-Del.) Hort. Soc. December, 1935.

Cory, E. N., H. G. Harns and W. H. Anderson—Dusts for the Control of Flies on Cattle. Journal of Economic Entomology.

DeVault, S. H.—Some Problems in the Conduct of Roadside Markets. Annual Report, Pennsylvania Vegetable Growers Association, January, 1936.

DeVault, S. H.—Report of the Economic Stabilization Committee on the Poultry Industry in Maryland. Annual Report of the Maryland State Poultry Council, January, 1936.

DeVault, S. H.—The Broiler Industry in Maryland. The Southern Planter, May, 1936.

Faber, J. E. and L. A. Black—The Influence of Physiological Salines in Complement Fixation Reactions. Journal of Laboratory and Clinical Medicine, 21: July, 1936.

Fisher, R. A. and R. P. Thomas—The Determination of the Forms of Inorganic Phosphorus in Soils. Journal American Society of Agronomy, 27: 1935.

Frazier, W. A.—Further Studies on Cracking of Tomato Fruits. Proc. Amer. Soc. Hort. Sci., 32: 1935.

Grau, F. V.—Factors Affecting Pasture Quality. Journal of American Society of Agronomy. 1936.

Greathouse, Glenn A.—Unfreezable and Freezable Water Equilibrium in Plant Tissues as Influenced by Sub-zero Temperatures. Plant Physiology, 10: October, 1935.

Greathouse, Glenn A. and M. W. Parker—A Dilatometer for Plant Materials. Plant Physiology, 11: January, 1936.

Greathouse, Glenn A. and Neil W. Stuart—Hydration Studies in Fresh and Dried Red Clover Tissue and Their Relationship to the Composition of the Tissue and Cold Hardiness. Amer. Soc. Plant Phys. and Amer. Soc. Hort. Sci., Joint Session, A. A. A. S., St. Louis, Dec. 30-Jan. 4, 1936.

Greathouse, Glenn A. and Neil W. Stuart—Seasonal Changes in the Physical and Chemical Properties of Foreign and Domestic Red Clover Plants. Amer. Soc. Plant Phys., A. A. A. S., St. Louis, Dec. 30-Jan. 4, 1936.

Greve, E. W.—Some Effects of Moisture and Nitrogen on Strawberry Runner Plants. Proc. Amer. Soc. Hort. Sci., 32: 1935.

Hamilton, A. B.—The Economy of Home Grown Feeds. Annual Report of the Maryland Crop Improvement Association, January, 1936.

Hesse, C. O. and A. L. Schrader—Some Results with the Electrical Maturity Tester in Measuring Developmental and Ripening Changes in the Apple. Proc. Amer. Soc. Hort. Sci., 32: 1935.

Lincoln, F. B.—Root Systems of Some Apple Varieties. Proc. Amer. Soc. Hort. Sci., 32: 1935.

Lumsden, D. V.—Anatomical and Biochemical Changes in Narcissus During Summer Storage at Various Temperatures. Proc. Amer. Soc. Hort. Sci., 32: 1935.

Norton, J. B. S.—Poisonous Plants. Maryland Veterinarian Society. January 16, 1936.

Norton, J. B. S.—Relation of Food to Health in Plants. Maryland Poultry Association. January, 1936.

Parker, M. W.—Physical and Chemical Properties of Soluble Polysaccharides in Sweet Corn. Plant Physiology, 10: October, 1935.

Rothgeb, R. G.—Sweet Corn Field Trials. Maryland Canners Association. December 6, 1935.

Russell, Ralph—Truck Transportation of Fruits and Vegetables in Western Maryland. Annual Report of Maryland Vegetable Growers Association. January, 1936.

Schrader, A. L.—How Do You Prune Your Peach Trees? Maryland Fruit Grower. November, 1935.

Schrader, A. L.—Introducing the Lodi Apple. Maryland Fruit Grower. August, 1935.

Schrader, A. L.—Comparison of Various Nitrogen Fertilizers, Especially in Relation to Fall Applications vs. Spring Applications. Annual Report. Maryland State Horticultural Society. January, 1936.

Schrader, A. L. and A. F. Vierheller—Pruning Peach Trees to Correct the Errors of Faulty Pruning. Annual Report. Maryland State Horticultural Society. January, 1936.

Sproat, B. B., G. M. Darrow, and J. H. Beaumont—Relation of Leaf Area to Berry Production in the Strawberry. Proc. Amer. Soc. Hort. Sci., 32: 1935.

Stuart, Neil W.—Adaptation of the Micro-Kjeldahl Method for the Determination of Nitrogen in Plant Tissues. Plant Physiology, 11: January, 1936.

Thomas, R. P.—Use of Rapid Soil-Tests in the United States. Journal A. S. A., 1936.

Wentworth, S. W.—Pistil Receptivity in the Northern Spy Flower from Cluster Bud to Petal Fall Stages. Proc. Amer. Soc. Hort. Sci., 32: 1935.

Wentworth, S. W.—What Do We now About New Fruit Varieties. Trans. Penin (Md.-Del.) Hort. Soc., December, 1935.

Woods, Mark W.—Chromosome Morphology in the Genus Tulipa. University of Maryland Biological Society, May 19, 1936.

LIST OF ACTIVE PROJECTS, 1936-37

* Purnell † Adams ** Bankhead-Jones

Agricultural Economics:

*A-18	Organization and Business Analysis of Maryland Farms.
*A-18-a	Insurance and Credit Problems of Maryland Farmers.
*A-18-e	An Economic Study of Livestock Farms in Maryland.
*A-18-f	An Economic Study of the Broiler Industry.
*A-18-g	An Economic Analysis of the Baltimore Milk Market.
*A-18-h	An Economic Study and Analysis of Dairy Farms in the Philadelphia Milk Shed.
*A-18-j	An Economic Study of the Bee Industry in Maryland: Management, Production and Marketing Practices and Problems.
*A-19	The Farm Tax Problem in Maryland.
*A-19-a	Probable Economy and Increased Efficiency in Local County Government Through Redistricting of the State.
*A-26	An Economic Analysis of the Present Status of the Marketing of Fruits and Vegetables by Motor Truck in New York City and Other Markets to which Maryland Produce Is Transported.
*A-26-a	An Economic Study and Analysis of the Baltimore Fruit and Vegetable Market.
*A-27	A Study of Basic Factors Related to Farm Planning in Maryland.
**A-28	The Effect of Motor Truck Transportation of Produce Upon the Marketing Facilities of Baltimore.
*A-29	The Status and Trends of Cooperative Marketing and Purchasing in Maryland, 1935 to 1936.
*A-30	Some Basic Factors Pertinent to the Establishment, Organization, and Operation of Production Point Cooperative Egg Auctions in Maryland.

Agricultural Engineering:

R-3	Development of a Small Electric Pasteurizer.
R-4	Soil Sterilization.
R-5	Temperature Control in Electric Heated Hot Beds.
**R-6	Grain Storage on the Farm.

Agronomy—Crops:

B-38	Corn.
B-39	Wheat.
B-41	Barley.
B-42	Hay, Forage and Pasture.
B-43	Annual Legumes.
*B-44	Sugar Corn—Seed Production and Breeding.
B-45	Miscellaneous Projects (Dairy Rotation).
*B-47	Studies on the Reproductive Capacity of the su (sugar) Factor in Relation to the Su (starch) Factor in Corn.
*B-48	The Effective Sex-Ratio in Corn and Its Relation to Yield.
**B-49	Improvement of Permanent Pastures in the Several Soil Provinces of Maryland.

Agronomy—Soils:

†O-25	Effect of Organic Matter on the Fertility of Leonardtown Loam.
O-27	Field Studies of the Fertility Requirements and Management of Important Soil Types.
*O-28	Fertilizer Studies with Early Potatoes and Sweet Potatoes.
O-31	Soil Fertility Studies in Relation to Tobacco Brown Root Rot.
*O-33	Efficiency of Soil Fertility Management.
*O-42	Effects of Fertilizer on Fertility and Grass Population of Pastures.

Animal Husbandry:

*C- 6	Study of Quality of Maryland Hams.
*C-10	Improvement of Thin Native Market Lambs and Lamb Meat by the Various Methods of Fattening.
C-13	The Breeding of Flock Ewes Suitable for Early Lamb Production.

Biological Laboratory:

*D-28	Studies of Blackhead (Infectious Enterohepatitis) in Turkeys.
D-33-a	A Study of the Urine of 100 (Brucella Abortus) Guinea Pigs at the Time of Death.
D-33-b	A Study of the Feces of 100 (Brucella Abortus) Guinea Pigs at the Time of Death.
D-34-a	The Examination of Urine of Cattle for Brucella Abortus.
D-34-b	The Examination of Feces of Cattle for Brucella Abortus.
D-35	Bovine Mastitis in Relation to Bang's Disease.
D-37	A Study of So-Called "Running Fits" in Dogs.
D-38	Studies on the Effects of Various Levels of Protein From Different Sources on the Internal Organs of Chicks.
D-39	Studies on Equine Encephalomyelitis.

Botany:

F- 7	Chromosome Studies in the Genera Ipomoea, Gladiolus, and Tulipa.
**F- 8	Plants Poisonous to Livestock.
**F- 9	Cytogenetic Studies in the Genera Gladiolus, Tulipa and Ipomea.

Dairy Husbandry:

G- 3	Control of Contagious Abortion in the Experiment Station Dairy Herd.
G-11	Growth Data on Dairy Animals from Growth to Freshening Age.
G-14	The Comparative Feeding Value Between Steam Dried and Flame Dried Fishmeal in the Raising of Dairy Calves and Heifers.

Entomology:

†H-21	Biology and Control of Some Greenhouse Pests.
†H-23	A Study of *Laspeyresia molesta* Busck in Maryland.
*H-28	Methods for the Control of the Potato Tuber Moth.
†H-30	Apple Insects
	a. Biology and Control of Apple Leafhoppers.
	b. Biology and Control of the Plum Curculio.
	c. Biology and Control of the Codling Moth.
	e. Biology and Control of Apple Aphids.
H-34	Insecticidal Properties of Pyrethrum and Its Products.
H-35	Nursery Insects.
H-36	Insecticidal Investigations.
	a. The Chemical, Physical and Insecticidal Properties of Pine Tar Creosotes and Some Allied Products, etc.
	b. Testing of New Insecticides and Commercial Materials Based Thereon.
*H-29	Investigation and Biology of Insects Infesting Canning Crops.
	a. Biology and Control of the Corn Earworm.
	b. Biology and Control of the Mexican Bean Bettle.
	c. Biology and Control of the Vinegar Gnat.
*H-38	Vinegar Gnat in Relation to Canned Tomatoes.
**H-39	Factors Involved in Spray Injury—Correlated With Iinsect and Disease Control and Physiological Effects.
H-40	The Japanese Beetle; Its Life History and Control.

Floriculture:

I-18	Sweet Peas. Varieties and Novelties.
I-19	Breeding and Selection of Snapdragons.
I-20	Gladiolus. Tests of Winter Blooming Varieties.
I-21	Treatment of Greenhouse Soils. Sterilization.
I-24	Peonies. Factors Affecting Floriferousness.

Home Economics:

T- 5	Methods of Cooking as a Factor in Palatability of Hams.
T- 8	Factors Influencing the Palatability and Food Value of Eggs.

Plant Pathology:

J-44	Plant Disease Survey.
J-45	Botanical Survey of Maryland.
J-46	Identification of Plants and Diseases.
J-48	Carnation Diseases.
J-50	Varieties Resistant to Disease.
*J-60	Pea and Cow Root Rots.
J-69	Tobacco Diseases.
J-71	Apple Scab.
J-72	Potato Seed and Disease Control.
*J-78	Strawberry Root Diseases.
†J-79	Life History of Caryospora.
**J-80	Disease Resistance in Potatoes.
**J-81	Disease Resistance in Peas.

Plant Physiology:

†K- 7	Physiological Study of the Resistance and Susceptibility of Vegetable Storage.

†K-17	A Physiological Study of the Resistance and Susceptibility of the Tomato Plant to Fusarium Wilt.
†K-18	A physico-chemical Study of the Soluble Polysaccharides in Sweet Corn.
†K-19	The Physiology of Cold Hardiness in Red Clover.
†K-20	Nitrogen Metabolism in Plants and the Relation of This Metabolism to Important Plant Responses.
†K-21	Investigations into the Nature and Inheritance of Resistance to Disease in the Genus Lathyrus.

Plant Propagation:

*E-1	Plant Propagation with Special Reference to Cuttings.

Pomology:

L-40	Breeding of Blight Resistant Pears.
L-45	Fruit Spur and Blight Resistant Pears.
L-47	Effect of Shade on Horticultural Plants, Fruits, Vegetables and Flowers.
L-48	Fertilization of Apple Orchards.
L-50	Sod vs. Tillage for Apple Orchards.
L-52	The Fertilization of Strawberries.
L-53	The Effect of Bud and Spur Defoliation on Fruit Bud Formation.
L-54	The Influence of Pollination on Fruit Yields.
L-55	Experiments in Grape Training and Pruning.
L-56	Rejuvenation of Peach Orchards.
L-57	Peach Pruning Experiments.
L-58	The Breeding of Early Colored Grapes.
L-59	Variety Tests of Apples, Peaches, Pears, Plums and Cherries.
L-60	Variety Tests of Grapes and Strawberries.
L-61	Variety Tests of Bush Fruits.
L-62	Transplanting Studies with Trees.
L-63	Collection of Phenological Data.
L-64	Apple Breeding and Testing of New Seedlings.
*L-65	An Economic Study of Peach Cling Stone Varieties for Canning.
*L-66	An Economic Study of Peach Planting Distances.
*L-67	A Study of Factors Influencing Color in Apples.
*L-68	A Study of the Effect of Nitrogenous Fertilizers on the Keeping and Shipping Qualities of Strawberries, Peaches, and Apples.
L-69	Studies of the Effects of Different Nitrogenous Fertilizers on Orchard Fruits.
L-71	Removal of Spray Residues from Fruits and Vegetables.
**L-72	Relations of Soil Moisture, Age of Plants, Size of Plants, Spacing of Plants, and Use of Mineral Nutrients to Flower Differentiation, Fruit Yield and Quality of the Strawberry.

Poultry:

M-28	Egg Laying Competition—(1) Studies of Seasonal Distribution of Egg Production as Influenced by (a) Rate of Production (b) Feed Rations. (2) Studies on Mineral Consumption.
M-29	Tests of Special Methods for Drying and Pulverizing Poultry Manure as It Comes from the Dropping Boards.
M-30	A Controlled Test to Determine the Efficiency of Approved Good Management in the Control of Bacillary White Diarrhea.
M-31	Factors Influencing the Food Value of Eggs Both Fresh and in Storage.

Ridgely Farm:

S- 1	Growing Multiplication Plots of Mammoth Red Wheat for Distribution.
S- 2	The Use of Fertilizers in the Rotation of Corn, Wheat, Hay and Tomatoes.
S- 3	Tests with Late Potatoes, New Varieties, and Seedlings.
S- 4	Variety and Fertilizer Tests of Strawberries.
S- 5	Experiments with Sweet Potatoes, Cantaloupes, Multiplication of Types.
S- 6	Experiments With Garden Peas for Canning.
S- 7	Tests of Varieties of Tomatoes and Early Plants on Total Yield.
S- 8	The Effect of Lime with and Without Fertilizers and Manure.
S- 9	Tests of Different Kinds of Lime on Alfalfa.
S-10	Variety Tests of Corn, Wheat and Soybeans.
S-11	Tests of New Selections of Wheat.

Seed Inspection:

N- 7	Inspection of Seeds Sold Throughout the State Each Year.
N- 8	Examination of Samples Taken from Seeds Sold Throughout the State Each Year.
N- 9	Examination of Samples Submitted to the Laboratory Each Year.
N-10	Identification of Seeds Submitted to the Laboratory from Time to Time.
N-11	Studies of Observed Variations Among Germination Tests.
N-12	Studies of Changes in Weight of Various Components of Seed Samples and the Resulting Effects on the Percentage Composition.
*N-13	Economic Use of Seeds.

Tobacco Investigations:

P- 1 Tobacco Breeding and Variety Tests.
P- 2 Crop Rotation Tests with Tobacco.
P- 3 Effects of Crops on Yields of Succeeding Crops in the Rotation with Special Reference to Tobacco.
P- 4 Fertilizer Tests and Studies in the Nutrition Requirements of the Tobacco Plant, with Reference to Both Quality and Yield of Leaf Tobacco.
P- 5 Improved Methods of Handling Seed Beds, Including Steam Sterilization.
P- 6 Nutritional Deficiency Studies.

Vegetable Gardening:

*Q-58 Factors Influencing Yield and Quality of Canning Peas.
Q-59 Rhubarb—Chemical Fertilizers with Especial Reference to Sulphate of Ammonia.
Q-60 Cantaloupes—Breeding and Selection.
Q-61 Sweet Potatoes—Fertilizers Best Nitrogen and Potash Carriers. Lime Influence Salisbury and Cheltenham.
Q-62 General Fertility Problem—Amounts of Manures and Fertilizers Etc. Effect of Continued Application of Potash Salts. Effects of Rye as a Winter Cover, Etc.
Q-63 Testing New Varieties and Strains of Vegetables.
Q-64 A Study of Maryland Vegetables as to Varieties, Cultural Methods and Marketing.
Q-65 Asparagus—Effects of Potash on Yield and Quality. Comparison of Spring and Summer Application of Commercial Fertilizers.
*Q-66 Selection of a Strain or Strains of Spinach That Will Meet the Markets and Canners Requirements.
*Q-67 The Influence of Green Manures Supplemented by Commercial Fertilizers in Tomato Production.
*Q-68 Breeding and Selection of a Fruitful Type of Lima Bean for Maryland.
Q-69 Changes in the Carbohydrate Content of Squash.
Q-70 An Economic Study of Grade, Maturity, Composition and Canning Quality of Corn as Influenced by Seasonal and Cultural Conditions.
Q-71 Potato Breeding and Inheritance.
Q-72 A Study of Factors Affecting the Development of Red Color and Quality of Canned and Raw Stock Tomatoes and of Market Garden Tomatoes.
Q-73 An Economic Study of Canning Crops in Rotation with Special Reference to Physiology and Pathology of Canning Peas.

PROJECTS CARRIED ON BY GRADUATE STUDENTS

Agronomy:

Chemical Studies on Corn. D. M. Goss.
The Exchangeable Cations Obtained in Representative Samples of the Most Important Soil Types in Maryland. (Supplementary to 0-33). Chester Cross and John Bartlett.
A Chemical Study of the Changes and Formations in the Leonardtown Hardpan. G. F. Madigan.

Animal Pathology and Bacteriology:

Comparison of Media and Incubation Temperatures for Bacteriological Analysis of Milk. Hutton D. Slade.
The Detection and Significance of the Escherichia-Aerobacter Group of Bacteria in Milk. M. T. Bartram.
Factors Affecting the Growth and Viability of Lactobacillus Acidophilus. A. P. Dunnigan.
The Growth and Viability of Pneumococci Upon Variations of Stock Culture Agar. I. Effect of Media Components. H. E. Crowther and L. A. Black.
The Growth and Viability of Pneumococci Upon Variations of Stock Culture Agar. II. Some Simplified Solid and Liquid Media. H. E. Crowther and L. A. Black.
Comparison of Media and Incubation Temperatures for Bacteriological Analysis of Milk. L. A. Black and Hutton D. Slade.
The Detection and Significance of Escherichia-Aerobacter in Milk. I. A comparison of Media for the Isolation of the Coli-Aerogenes Group. M. T. Bartram and L. A. Black.
The Detection and Significance of Escherichia-Aerobacter in Milk. II. Identification of Species Isolated. M. T. Bartram and L. A. Black.
The Detection and Significance of Escherichia-Aerobacter in Milk. III. Relationship of Total Bacterial Count and Presence of the Coli-Aerogenes Group in Raw and Pasteurized Milk. M. T. Bartram and L. A. Black.
The Detection and Significance of Escherichia-Aerobacter in Milk. IV. Productivity of Media Used in Isolation. M. T. Bartram and L. A. Black.
Some Effects of Media, pH and CO_2 on the Growth of L. Acidophilus. A. P. Dunnigan and L. A. Black.
The Influence of Buffering Substances on the Growth and Viability of L. Acidophilus. A. P. Dunnigan and L. A. Black.

Dissociation of L. Acidolphilus. A. P. Dunnigan and L. A. Black.
Some Factors influencing Hemolytic Activity of Guinea Pig Complement. J. E. Faber, Jr. and L. A. Black.

AGRICULTURAL ECONOMICS

Work was conducted on twelve projects during the year. Some of the accomplishments and significant contributions in selected projects are listed below.

Farm Organization and Management

Farm Credit:

The results of the farm credit study have been prepared in the form of a Credit Handbook. This has been published as Bulletin No. 396.

Livestock Farms:

Farm management records were obtained on over 50 livestock farms for a period of two years.

The average farm investment was $23,336. Receipts averaged $3,846 per farm, and expenses averaged $2,700, giving a farm income of $1,146 per farm. Farm income on the well organized and managed farms averaged $1,885, and the labor income was $979, whereas on the unprofitable farms the farm income was $393 and the labor income $1,038.

Specialized Broiler Farms:

During the fiscal year 1935-36, business analysis records were taken on 109 farms specializing in the production of broilers. Because of the urgent demand for information about the broiler industry, the first year's results were released in Bulletin No. 390 in January, 1936.

According to the study the broiler industry is of comparatively recent development, as 53 per cent of the producers have been operating less than five years. The average number of birds per farm was 8,231. Feed cost made up 53 per cent of the total cost. Total cost, including unpaid family labor, averaged 47.9 cents per bird, and income was 49.4 cents per bird, leaving a net profit of 1.5 cents per bird.

Poultry Farms:

Farm management records have been obtained for three years on 100 poultry farms. A manuscript giving the results of the three-year study is ready for press.

The average farm income was $1,171, and the average labor income was $728. The average number of birds per flock was 781, and the egg production per hen was 127 eggs. The larger size flocks were more profitable measured in terms of farm income or labor income. Farms with a production of 140 eggs or more per bird had the largest labor income, $1,431, and the labor income per farm decreased with the decrease in eggs per bird, averaging less than $100 for farms with an egg production of less than 100 eggs per bird.

Dairy Farms:

Farm management records for three consecutive years have been obtained on 285 specialized dairy farms. The records have been tabulated and the report is now being prepared for publication.

Basic Factors Related to Farm Planning:

This project was begun in April, 1935, as a joint study with the Bureau of Agricultural Economics, and the Agricultural Adjustment Administration.

The state was divided into type-of-farming areas and recommendations were made as to changes in acreage and production of each crop, in number and production of each class of livestock, in feed importations, and in utilization of land in each type of farming area, in order that soil fertility may be retained, erosion controlled, and efficient and sound farm management practices may be promoted. This phase of the project has been completed and the detailed report submitted to the Federal government.

This Department has cooperated with the State Extension Service in carrying out the plans of this project. This Department supplied the statistical data showing the trends in agricultural enterprises in each county. The Extension Service conducted county meetings and obtained from representative farmers, through the means of a questionnaire, data as to what the future trends should be in agricultural production in the county. The data from farmers are being tabulated in the office of the Department and will later be correlated with the recommendations made in the research study pertaining to adjustments in agriculture.

FARM TAXATION

Tax Delinquency:

Data were collected on farm tax delinquency in Maryland through funds made available by the Civil Works Administration. Statistics were collected on over 30,000 pieces of property.

According to the study, installment payments, closer agreement between time of payment and time of cash income of the taxpayer, especially in respect to farmers, discounts for early payments, and penalization in the form of rapid tax sales for habitually negligent property owners, would assist in prompt payment of Maryland taxes. Bulletin No. 381, giving the results of the study, was published during the year.

Retail Sales Tax:

An analysis was made of existing sales tax laws in the various states, especially those features dealing with the administration and collection of the retail sales tax. Other statistical data bearing upon this subject and portraying the problems of the retail sales tax were analyzed. A trip was made to the following states for the purpose of contacting sales tax administrators in reference to their experience and problems connected with the sales tax: West Virginia, Kentucky, Illinois, Indiana, Michigan, and Ohio. The information obtained and observations made on this trip, combined with the above mentioned analysis, constituted the basis for Maryland Agricultural Experiment Station Special Bulletin No. 1 (Mimeographed report) entitled, "The Retail Sales Tax."

Motor Vehicle Property Tax:

At the request of the Maryland State Planning Commission a study was made of the property tax system as it affects motor vehicles in this State. This study necessitated a visit to, and analysis of, the property tax system as it affects motor vehicles in 17 counties of Maryland. Certain statistical data that portray the effects of different systems used in the counties were collected. The major features of the motor vehicle property tax system and its association with the motor vehicle license system are discussed in the joint report of the Maryland Agricultural Experiment Station and the Maryland State Planning Commission in Special Bulletin No. 2, entitled, "The Assessment and Collection of Motor Vehicle Property Taxes in Maryland."

Study of Local Governments:

During this year the study of the possible economy and increased efficiency through reorganization of county governments was extended to cover all counties of the State. Detailed data of the various county levies for the year 1935-36 have been collected, analyzed, and tabulated. A plan of reorganizing and redistricting the county governments has been set up on a statistical basis. The facts and discussions are in a form about ready for publication.

An analysis has been made of the revenue receipts and expenditures of the incorporated places of the following counties: Allegany, Washington, Frederick, and Carroll. This study is being made with the object of determining the possibilities of increased economy and efficiency by eliminating incorporated towns as such and combining them with county governments in respect to many functions. This particular phase of the local government study has reached the stage of statistical analysis and tabulation.

Farm Organization Tax Report:

Considerable research was necessary as a background to the preparation of a joint tax report of the Maryland State Grange and the Maryland Farm Bureau Federation. This work involved the compilation of revenue returns from specific kinds of taxes employed in other states, estimated returns of various tax measures for relief purposes in Maryland, the extent and probable need of tax revenue for relief purposes in Maryland, and the relationship of relief costs to property taxes. The data are contained in the 1935-36 report of the Joint Tax Committee of the Maryland Grange and Maryland Farm Bureau Federation.

MARKETING

Marketing of Fruits and Vegetables by Motor Truck:

The data from 189 growers' records obtained from farmers in the truck and market gardening areas about Baltimore and Washington and in the fruit producing regions of Washington County have been tabulated, analyzed, and prepared in manuscript form. The data have been analyzed as to marketing methods, costs and practices. Elements of cost in truck transportation and the factors affecting them have been analyzed in detail.

Analysis of the Baltimore Fruit and Vegetable Market:

This study is divided into two parts, one confined wholly to the Marsh Market, which is a wholesale market in which sales are made through commission brokers, and the other covering the railroad terminals, boat terminals, commission wholesale market, jobbing market, chain stores, and public retail markets.

The data pertaining to Marsh Market have been collected, tabulated, and written up in manuscript form, while the data pertaining to the other market outlets are being collected.

The purpose of this study is to obtain information about the origin of receipts at the different markets, the channels and costs of distribution, marketing facilities, congestion on the different markets, and to work out a plan for reorganizing the markets in such a way as to facilitate the movement of produce and reduce the costs of marketing.

About 140,000 tons of produce are sold annually in Marsh Market, three-fourths of which comes from Maryland. About 85 per cent of the produce is sold for consumption in Baltimore, and 15 per cent is sold in Baltimore and shipped to other markets. Jobbers take about 46 per cent of the produce, canners 48 per cent, and the remainder is sold direct to retailers, peddlers, hucksters, etc.

Analysis of the Baltimore Milk Market:

The data for this study are being obtained from the files in the office of the Maryland Cooperative Milk Producers in Baltimore, and from records of the Health Department.

The following outline indicates the scope and type of information that is being assembled: Total amount of fluid milk and cream received in the Baltimore market from producers in Maryland and producers in other states; total amount of milk and cream shipped from Maryland to other markets outside the State; basic allotments of producers; classes of milk shipped by each producer and amount in each class; price received for each class of milk; butterfat test of the milk of each producer; amount of butter, ice cream, cottage cheese, chocolate milk, and buttermilk manufactured in Baltimore; trend in receipts of milk by the Association and by dairies not dealing with the Association; trends in the consumption of milk in Baltimore and the probable milk requirements for the future.

In addition to the projects listed above, the following cooperative projects with Federal and State agencies are now in progress: "A Study of Farm Organization and Soil Management Practices in Maryland in Relation to Agricultural Conservation and Adjustment, With Special Reference to Formulation of Programs under the Soil Conservation and Domestic Allotment Act." The cooperating agencies in this project are the Bureau of Agricultural Economics of the U. S. Department of Agriculture, the Department of Agricultural Economics of the Maryland Agricultural Experiment Station, the Agricultural Adjustment Administration, and the Soil Conservation Service.

The objective of this project is to provide information to be used in revising and improving the Agricultural Conservation Program by: (1) A study of farm organization, operation, and extent of erosion in three typical areas in Maryland to determine: (a) The effect of cropping system and farm practices on soil erosion, soil depletion, and economic farm operation; (b) The relation of prevailing farm practices to needed adjustments in the area, and the cost and need of practices effective in controlling erosion and soil depletion. (2) To revise the recommendations made in connection with the Regional Adjustment Project in 1935 for the three areas studied, and, so far as results of this study are applicable, to revise the recommendations for the other areas in the State in order to provide a better basis for planning and administering the Agricultural Conservation Program.

As the basis for providing the information necessary, a survey will be carried out on about 125 farms in each of the following areas: 1. The Middletown Valley of Frederick County; 2. The tobacco section of northern Calvert and southern Anne Arundel Counties; and 3. Trucking areas in Wicomico and Somerset

Counties. Two farm management specialists and two soil conservation specialists have been employed and are now fielding the schedules in the Middletown Valley of Frederick County.

"County Planning in Maryland." The Extension Service conducted county meetings and obtained from representative farmers through the means of a questionnaire, data as to what the future trends should be in agricultural production in the counties. The Department of Agricultural Economics is cooperating with the State Extension Service in carrying out the plans of this project. This Department has completed its analysis of the statistical data showing the trends in agricultural enterprises in each county. This information will be correlated with the research study made during the summer and fall of 1935-36 pertaining to the basic factors related to farm planning in Maryland.

"Land Use Planning Program in Maryland." This Department is cooperating with the Resettlement Administration in a research project in land use planning in Maryland. Mr. J. W. Coddington has been appointed as Land Use Planning Specialist in Maryland by the Resettlement Administration in cooperation with the Maryland Agricultural Experiment Station. Mr. David E. Derr has been appointed Assistant Land Use Planning Specialist in Maryland.

The first project selected for study is, "The Economic and Social Status of the Farm People in Special Problem Areas of Maryland and the Possibilities of their Improvement." Four problem areas in Maryland will be studied, namely, the tobacco section of Southern Maryland, the Lower Eastern Shore region, the mountain region of Western Maryland, and the tenant area of the Northern Eastern Shore. The work is now under way in the tobacco section of Southern Maryland.

In addition to this, the department cooperated with the State Roads Commission, the Maryland State Planning Commission, and the Maryland Legislature in research studied in highway finance, local county governments, and various phases of the tax problem.

AGRICULTURAL ENGINEERING

The problems of an engineering nature calling for research are constantly growing. The requests from farmers for engineering help are also increasing. During this year some time has been given to problems connected with the electric heating of hotbeds, greenhouse benches and soil sterilization; but they need more time to concentrate on them if substantial progress is to be made. Considerable time has been given to cooperating with the Federal Government on district farm drainage projects on the Eastern Shore of Maryland. Some work has just been started in cooperation with the U. S. Department of Agriculture on Grain Storage. The research work in engineering needs the equivalent of the full time of at least one well trained man. The department also needs more and better laboratory space.

DEPARTMENT OF AGRONOMY

Specific trends in agricultural production are observable at all times. Some of them are important on account of the rate at which they proceed, and others because of the marked influence they exert upon the agriculture of the state. The three aspects of the Agronomy work of the Station treated in this report are precise examples of trends that promise to be of major importance in the agriculture of the state.

SOIL CONSERVATION

More than usual interest has been shown by Maryland farmers during the last few years in the permanent preservation of their soil resources. The first great movement in the solution of this problem, and perhaps the most important, had its beginnings about 1890. In the twenty to thirty years that followed there was a complete revision of the cropping plans in the state. Corn land that formerly was planted to spring oats and thus allowed to remain over winter unprotected under the new system was planted to a winter grain crop. This crop usually was wheat but in some instances rye was planted and in recent years a large percentage of the corn stubble land has been planted to winter barley. The extent to which the revised cropping program was finally adopted is indicated by the 1930 census. At that time the total acreage in cultivated crops was 31 per cent of all crop land. If it is assumed that half of the truck crop land is planted to some cover crop, then that, together with the 22 per cent planted to winter grain crops, leaves a net deficit of 3 to 4 per cent of unprotected crop area each year. This is a relatively low acreage, but it is higher than is warranted for the best interest of our soils.

The gains made by the adoption of these soil protective measures during the last 45 years must not be lost through improvident planting systems or ill-conceived rotation and cropping practices. Although its inception was purely economic, its effect on the preservation of our soils has been far more important than the direct crop income derived from the practice. In preserving, at all hazards, this important soil conservation practice, farmers should familiarize themselves with the new soil conservation practices being worked out in three demonstration centers in the state, and apply those measures to their own farms as far as practical.

SOIL TESTING

Soils are reduced in fertility by the crops removed, by erosion and by leaching. In keeping the fields covered with crops to the fullest extent the last two of these losses are reduced to a minimum. Since it is only the available and easily soluble mineral nutrients that can be used by a particular crop, it is not only important that these substances be preserved, but it is important that the extent of the supply be known. The development of rapid chemical tests and the adaptations of the procedure to many of the soils of Maryland has made it possible for the Experiment Station to extend this testing service to many farmers who have experienced definite soil fertility difficulties. The fact that the rapid tests are approximations and are valuable to the extent that the procedure is adapted to the soil in question and the interpretation placed upon the laboratory results, it is highly important that the recommendations be made by experienced and impartial soil and crop investigators. The trend is definitely toward the use of the rapid tests as an index to the lime and fertilizer requirements of the soil. As a permanent system its value will depend upon the progress that can be made in the development of reliable technique, through research on all of our soils.

HYBRID SWEET CORN

A very definite change has occurred in the sweet corn seed situation during the last few years. It is estimated that the 1935 production of hybrid seed is sufficient to plant nearly the entire canning corn acreage, and more than half of the entire sweet corn for sale acreage in the United States. Sweet corn seed production is limited largely to northern areas. The rather elaborate equipment required to handle and market properly a seed crop makes it necessary to produce it in considerable volume. In Maryland the chief problem has been the testing of strains that are offered to the growers of the state. This work was begun by the Station several years ago and has been the means of keeping the growers fully advised during the period of transition from the use of open-pollinated to hybrid seed. Not only have these tests provided timely information for growers, but they have been of great value in promoting the sweet corn breeding program of the Station.

ANIMAL AND DAIRY HUSBANDRY

The projects listed in the previous Annual Report have gone forward as rapidly as facilities and circumstances would permit. Reports on some have been prepared for publication and will be issued as bulletins or in some scientific journal. A brief summary of the progress of some projects is as follows:

AN ECONOMIC STUDY OF MARYLAND LIVESTOCK FARMS, 1934 AND 1935

The data from which this summary report is made were obtained by the use of individual questionnaires and personal interviews with operators of livestock farms in Carroll, Frederick, Howard, Montgomery and Washington Counties, sections of the State in which most of the livestock farms are concentrated. Records were obtained on fifty farms in 1934 and on fifty-seven farms in 1935. The farms surveyed represent about ten per cent of the livestock farms in the State.

The following table presents a summary of farm organizations on the basis of averages per farm for the years 1934 and 1935.

SUMMARY OF FARM ORGANIZATIONS—1934, 1935, AND THE TWO-YEAR AVERAGE
(Averages Per Farm)

Item	1934	1935	Two-Year Average
Number of records	50	57	107
Total acres operated	265	269	267
Acres in woods	29	33	31
Acres in pastures	72	92	83
Acres in crops	126	130	128
Corn	26.3	29.3	27.9
Wheat	40.9	42	41.5
Hay	38.2	35.7	36.9
Yields per acre:			
Corn (bushels of ears)	76.6	100.4	89.7
Wheat (bushels)	23.5	24.2	23.9
Hay (tons)	2.1	1.6	1.8
Average number of:			
Steers	26.9	25.1	25.9
Hogs	27.8	21.7	24.6
Sheep	25.8	25.4	25.6
Total investment	$22,727	$23,870	$23,336
Beef cattle	1,256	1,712	1,499
Hogs	194	237	217
Sheep	185	188	187
Land	9,730	9,650	9,687
Buildings	7,939	8,298	8,130
Other	3,423	3,785	3,616
Total receipts	3,535	4,119	3,846
Beef cattle	1,206	1,677	1,457
Hogs	277	531	412
Sheep	183	181	182
Dairy and poultry	337	338	338
Crops	1,115	1,080	1,096
Increased feed and supplies	286	185	232
Miscellaneous	131	127	129

SUMMARY OF FARM ORGANIZATIONS—(Continued)

Item	1934	1935	Two-Year Average
Total expenses	2,550	2,831	2,700
Hired labor	658	711	686
Board for hired labor	224	184	203
Repairs	209	223	216
Feed	233	424	335
Seeds	68	86	78
Fertilizer and lime	206	275	243
Insurance	63	56	59
Taxes	226	244	236
Miscellaneous	631	628	629
Decreased feed and supplies	32	....	15
Farm income	985	1,288	1,146
Interest on investment	1,136	1,194	1,167
Labor income	—151	94	—21

Large gross receipts alone are not a guarantee of high profits. Effective farm organization and efficient operation, coupled with large gross sales are of primary importance in assuring large profits.

Livestock enterprises may be increased both in size and in intensity of operation without adding materially to overhead expenses. The number of animal units per acre may well be increased from one animal unit to each 5.8 acres to one to every 3 or 4 acres. The number of animal units per farm may be increased by 20 to 25, the increase to consist mostly of beef cows, sheep and hogs, rather than steers.

Labor was very inefficiently used, the average farm having only 142 work units per man.

One of the greatest needs on the average farm is an increase in the production of legume hay. Also wheat acreage may well be reduced and the land devoted to the production of corn and barley for feeding purposes.

The quality of pasture was generally low and attention should be given to its improvement.

Steer feeding in Maryland is probably the least profitable livestock enterprise from the standpoint of gross returns on investment, hogs and sheep being consistently more productive.

There is some indication that a herd of beef cows will return more on the investment than will steer feeding.

The hog enterprise on Maryland livestock farms should be increased from its minor position to one of main importance.

Sheep consistently returned a profit on the investment. A flock of less than 100 ewes will not return enough profits to make the enterprise attractive.

The Use of Annatto as a Denaturing Agent in Cream

Cream for manufacturing purposes produced under conditions which do not meet the requirements for market milk and cream is sometimes diverted into market milk and cream channels. Also cream offered for sale by cooperative marketing organizations for manufacturing purposes only is also sometimes diverted into market milk and cream channels.

In some sections of the United States salt is used as a denaturing agent in cream for buttermaking and sugar is used as a denaturing agent in cream for ice cream making. A universal denaturing agent for cream for manufacturing purposes that may readily be detected would be desirable.

We have found that annatto (Hansen's cheese color) in concentration of 1 to 20,000 can be added to cream containing approximately 40 per cent butterfat without causing a perceptible change in color of the cream.

Annatto can readily be detected in cream containing approximately 40 per cent butterfat in concentrations as low as 1 to 1,000,000 by means of a modification of the A. O. A. C. official method.

Studies in the Quality of Maryland Hams

During the past year further studies were made on the quality of Maryland hams. A further comparison between the dry-cured and brine-cured hams tended to show that there was not much difference between the two in regard to shrinkage, flavor and aging of the uncooked hams, but the brine-cured hams showed a greater cooking loss in most cases than the dry-cured hams.

Four brine-cured and four dry-cured hams were placed in an incubator and heated intermittently, leaving the heat on two days and off two days. The hams did not age as fast under this treatment, but they had a very desirable flavor.

After some hams had attained a desirable degree of aging they were placed in cold storage at 20° F. and cooked later at intervals. Freezing seemed to hold the hams at the same degree of aging and no undesirable effects were produced by freezing.

Another group of hams, put in cure January 8, 1936, are now aging. Different cures are being tried using 2, 3, 4 and 5 pounds of sugar with the regular curing mixture. Eight pounds salt, 2 pounds sugar and 3 ounces of saltpeter is the standard curing mixture used. Another trial is being run on intermittent heating and one series is being kept in a chamber that has humidity partly controlled.

Livestock Owned:

The table following indicates the number of head of livestock owned by the University of Maryland Agricultural Experiment Station and under the supervision of the Animal and Dairy Husbandry Department. There are a total of 92 dairy cattle, 119 head of swine, 6 Percheron horses, 5 Aberdeen-Angus cows, and 211 sheep.

NUMBER OF LIVESTOCK OWNED BY THE UNIVERSITY OF MARYLAND AGRICULTURAL EXPERIMENT STATION

Dairy Cattle		Swine		Horses (Otten Farm)		Beef Cows		Sheep	
Ayreshires	22	Purebred Poland-Chinas and Duroc-Jerseys:		Percheron mares	4	Aberdeen-Angus cows	5	Hampshire ewes	37
Guernseys	24	Boars	3	Foals	2	(with calves at foot and to be re-bred).		Hampshire lambs	14
Holsteins	26	Shoats	27	Total	6			Hampshire rams	14
Jerseys	20	Sows	16					Crossbred ewes	112
Total	92	Gilts	2					Crossbred lambs	30
		Spring pigs	71					Crossbred rams	1
		Total	119					Ryeland ram	1
								Southdown rams	2
								Total	211

Dairy Herd:

The dairy herd still continues on the accredited list, being free from both tuberculosis and Bang's disease.

Since April 1, 1936, all animals in our dairy herd have been placed, for the first time, under the Herd Test plan of testing as conducted by each of the Breed Associations. This plan of testing will give us an accurate, authoritative, and official record on all cows in the herd of milking age.

Livestock Recently Purchased:

Percheron Horses: Just recently four purebred Percheron mares and two foals have been purchased from Claus Reyelts of Britton, South Dakota. The mares are Lucile Mae 212969, Countess Louise 212968, Victoria Lois 198331, with her filly foal, Maryland Anne, and Countess Lou 207596 with her stallion foal Count Robin. The mares are all blacks, ranging in age from 3 to 9 years. These mares carry the blood lines of the imported stallions Actionnaire and Historien.

Three of these mares have already been bred to Sir William, who was grand champion at the 1933 International Livestock Exposition. Sir William is owned by Ed. Nicodemus, Waynesboro, Pa.

Two other purebred Percheron mares which have been owned by the University for some time have been bred to George Washington, a stallion owned by Robert Rench, Hagerstown, Maryland.

These mares and foals, with their prospective offspring expected as a result of the recent matings indicated above, will form the nucleus of a representative group of purebred Percherons and are a valuable addition to the livestock owned by the University from the standpoint of both the Experiment Station and College.

Aberdeen Angus Cattle: Arrangements have been made whereby the University of Maryland Agricultural Experiment Station will secure five young Aberdeen-Angus cows, with calves at foot, and re-bred. These heifers and their anticipated progeny, selected from the herd of Mr. Dean Bedford, Harford County, Maryland, will be the foundation and nucleus of a herd of beef cattle and will constitute a group of young cattle from which a representative herd, useful for both research and instruction, will be developed.

Land and Buildings Acquired:

About two hundred and twelve acres of land contiguous to the University campus have been acquired during the year. This additional land probably will be used primarily for dairy purposes. New and modern dairy barns and a judging pavilion, which will also include a meats laboratory, are being erected on a site convenient to the campus. When these structures are completed and available the facilities for both teaching and research will be greatly improved.

The University has also acquired 223 acres of land, formerly the Otten Farm, at Pfeifers Corners, located about 20 miles from the campus. The present plan is to utilize this area as a livestock farm. With sufficient funds, additional livestock, and proper organization and management the acquisition of this land materially enlarges the facilities for research and teaching in animal husbandry.

THE DAIRY INSPECTION SERVICE

(For period ending June 30, 1936)

The Maryland Dairy Inspection Law was enacted by the Maryland Legislature in 1935 and was amended in 1936. The purpose of this law is to insure producers who sell milk and cream on the basis of butter-fat test or weight, that the tests and weights of such milk and cream will be correctly made, and likewise to insure the dealers who purchase such products that their agents or testers shall correctly weigh and test the milk and cream; also to insure that the tests made for official inspection or for public record will be correctly made. The law further provides, that to under-read or over-read the test percentage, to fraudulently manipulate the Babcock test, or to falsify the records are violations.

Milk and Cream Dealers' Permits.—A summary of Milk and Cream Dealers' Permits issued since June 1, 1935, is presented in the following table:

MILK AND CREAM DEALERS' PERMITS ISSUED

Period	Number
June 1 to Dec. 31, 1935	153
Jan. 1 to June 30, 1936	154

Weighers' and Samplers' Examinations and Licenses.—A summary of Weighers' and Samplers' examinations given and licenses issued is presented in the following table:

WEIGHERS' AND SAMPLERS' EXAMINATIONS AND LICENSES

Period	No. of Examinations	No. of Candidates	No. Passed	No. Failed	Licenses Renewed	Total Licenses Issued
June 1 to Dec. 31, 1935	36	191	145	46	......	119
Jan. 1 to June 30, 1936	6	12	11	1	98	120
Total	42	203	156	47		

Failure to pass the examinations was due to lack of understanding of the principles involved in proper weighing and sampling.

Testers' Examinations and Licenses.—A summary of Testers' examinations given and licenses issued is presented in the following table:

TESTERS' EXAMINATIONS AND LICENSES

Period	No. of Examinations	No. of Candidates	No. Passed	No. Failed	Licenses Renewed	Total Licenses Issued
June 1 to Dec. 31, 1935......	32	268	223	45	......	181
Jan. 1 to June 30, 1936......	10	37	28	9	175	214
Total	42	305	251	54		

Failure to pass the examination was due to lack of understanding of the principles involved in Babcock testing and to incorrect methods of testing. Several candidates appeared for the examinations who had never tested milk, while others appeared who had never tested cream.

Inspections.—A thorough inspection was made of all equipment used in weighing, sampling, and testing and of the methods employed upon each visit to the plants. The accuracy of the work of the licensed testers was determined by observing their methods and by retesting a number of their samples. Suggestions were made for the betterment of conditions in general.

A summary of the inspection work is presented in the following table:

SUMMARY OF INSPECTIONS

Period	Miles Travelled	Inspections Made	Fresh Samples Tested	Composite Samples Tested
June 1 to Dec. 31, 1935...........	2,355	112	80	482
Jan. 31 to June 30, 1936...........	5,509	218	325	806
Total	7,864	330	405	1,288

Calibration of Glassware and Weights.—The calibration of glassware and weights has eliminated errors from this source in testing milk and cream.

A summary of glassware and weights calibrated is presented in the following table:

CALIBRATION OF GLASSWARE AND WEIGHTS.

Period	Pieces Tested	Pieces Not Within Tolerance Allowed	Percent Not Within Tolerance Allowed
June 1 to Dec. 31, 1935.........	8,220	102	1.240
Jan. 1 to June 30, 1936.........	3,083	6	0.194
Total	11,303	108	0.955

Testers' Licenses Revoked.—Whenever a tester is found manipulating tests, weights, or records, either intentionally or unintentionally, he is first warned to discontinue such practice. Whenever such violations continue, the evidence is presented, and if justified, his license is revoked. During the period from January 1 to June 30, 1936, one testers' license was revoked.

Prosecutions.—During the period from June 1 to December 31, 1935, one cream station operator was found testing without a testers' license. Also during the period from January 1 to June 30, 1936, one cream station operator was found testing without a testers' license. During the latter period one dealer refused to obtain, voluntarily, a Milk and Cream Dealers' Permit. In each case prosecutions were instituted by representatives of the Dairy Inspection Service and each defendant was fined the sum of ten dollars ($10.00).

ANIMAL PATHOLOGY AND BACTERIOLOGY LIVE STOCK SANITARY LABORATORY

The research in the fields of animal pathology, bacteriology and animal diseases has been conducted through a very close cooperation of these departments of the Experiment Station with the Biological Laboratory and the Live Stock Sanitary Laboratory.

An idea of the research activities of these departments is given by the list of projects in progress by the staff and graduate students together with the list of bulletins and papers published. The following statement gives the status of some of the projects:

Project D-28. Studies of Blackhead (Infectious Enterohepatitis) in Turkeys.

These studies took form under three heads which are given below.

1. The viability of Histomonas meleagridis in soil experiments.

This experiment has been conducted with a view to investigating the transmission of the Blackhead parasite through Heterakis eggs.

An approach to this problem was attempted by contaminating small batches of dirt. In one instance droppings containing Histomonads and Heterakis eggs were used. On the other hand droppings containing only Histomonads were used. Young chicks and poults were later placed on these samples of soil to see whether they would pick up the Histomonads. As a result, two cases of Blackhead were encountered in 10 poults placed on one lot of dirt that had previously been contaminated by both Histomonads and Heterakis eggs. Furthermore, 10 other poults existed throughout the summer without contracting Blackhead on a sample of soil contaminated by Histomonads alone. It therefore appears that Histomonads do not form a resistant body of their own. Their existence in Heterakis eggs is strongly suggested.

2. Immunological studies.

Immunological studies were attempted last year by inoculating young poults with a culture of Histomonads that had been propagated in the laboratory for some months. Later these poults, as well as a group of uninoculated poults, were exposed to the disease on contaminated soil. Blackhead occurred in both lots of poults and it appeared that the Histomonad cultures had lost their immunizing power. During the fall of 1935 a fresh culture was obtained for the purpose of conducting similar experiments during the summer of 1936. Unfortunately this culture was lost during the rush of the routine bloodtesting work for Pullorum disease. A further attempt to isolate a suitable culture is being made at the present time.

3. Rearing a flock of turkeys in an isolated brooding yard.

As a means of testing out ability to rear turkeys on the premises where chickens are kept, but with a reasonable degree of isolation, a small group of turkeys was brooded about 200 yards from our main poultry plant. As a result, four cases of Blackhead were encountered among 27 poults hatched for this purpose. The surviving birds were very good specimens and served in part for replacements in our breeding flocks.

Projects D-33 a and b. Studies of Urine and Feces of Infected Guinea Pigs (Brucella abortus).

These data are being held for publication at some future date with other material along similar lines.

Projects D-34 a and b. Studies of the Elimination of Brucella abortus in the Urine and Feces of Cows.

No definite work has been done under this project because of lack of field help for the proper collection of the materials. The data already accumulated are so scant that publication now is not justified.

Project D-35. Bovine Mastitis in Relation to Bang's Disease.

The data collected under the conditions outlined for this project proved inconclusive. A conference with the management at Indian Spring Farm, with whom the study was conducted, indicated that a more definite method of diagnosis at the farm and in the laboratory would have to be developed in order to arrive at a satisfactory result. Studies are being made of new methods at the present time and work will be picked up again as soon as arrangements can be made.

Project D-37. Studies of So-called "Running Fits" in Dogs.

These investigations have been continued with material from another source, also with the biscuits which had caused the condition when fed to 15 dogs in one kennel in Baltimore. Feeding trials showed that one feed would produce the condition within 24 hours and in one case three feedings produced death.

Our studies to date indicate the presence of a toxic substance in the feed, the agent causing its formation still being unknown. Deficiency in minerals in the ration do not seem to be causative, nor do parasites, distemper or other diseases appear to play even a secondary part. So far, toxicity for guinea pigs has not been shown.

Project D-38. Studies of the Effects of Various Levels of Protein from Different Sources on the Internal Organs of Chicks.

This project has been started with 225 S. C. W. L. chicks, divided into 15 lots of 15 each. Rations containing 12, 16, 20, 24, and 28 per cent protein, using fish meal, meat meal and soya bean meal have been prepared. The basic ration is the same in all cases, being made up of ground yellow corn, wheat middlings, dried yeast, calcium carbonate, calcium phosphate, sodium chloride and cod liver oil.

Weighings to check upon growth are made at weekly intervals, at which time also one chick from each group is destroyed for material for pathological studies. Notes are kept as to the condition of the various lots. It is planned to continue the studies through egg production if the facilities at the laboratory will allow. For a complete study a laying house should be provided to continue a large group through.

Project D-39. Studies on Equine Encephalomyelitis.

During the early summer of 1935 vaccine made with the Eastern strain of virus was used on about 385 horses in Anne Arundel, Calvert and St. Mary's counties. The treatment consisted of two subcutaneous injections made on the side of the neck. No untoward results followed the injections but no definite information was gained as to the efficacy of the treatment since no known cases of the disease were seen in the sections chosen for trial. As a matter of fact no defifinite cases were seen in Southern Maryland, although some reports came from the Eastern Shore that a few cases occurred there.

This study should be continued in this form for another year at least, since previous records indicate that the disease was present for about five seasons.

Other Activities.

Most of the time of the members of the staff in these departments is given to teaching, disease diagnosis and control, and routine laboratory examinations. A relatively small amount of time can be concentrated on the research projects.

The following summary indicates some of the matters handled:

Bacteriological examination of water	200 samples
Bacterial content of milk	500 samples

Bacteriological examination of all milk used by the University dining hall and produced by the University herd.

Examination of blood, urine, sputem of students in the College hospital	100 specimens

The Laboratory prepared and supplied farmers with 2586 tubes of Legume inoculum. This was enough for bushels of seed.

The Laboratory supplied

Anti-hog-cholera serum	209,700	cubic	centimeters
Hog-Cholera virus	870	"	"
Tuberculin	20,230	"	"
Mastitis Bacterin	35,380	"	"
Periodic Opthalmia Bacterin	11,525	"	"
Miscellaneous Bacterins	655	"	"

The Live Stock Sanitary Laboratory made diagnosis and examinations

Cattle	Total	52,061
Horses and mules		268
Swine		155
Sheep and goats		16
Dogs		31
Cats		3
Rabbits		4
Chickens (Pullorum)		63,172
Chickens (miscellaneous)		881
Turkeys		166
Ducks and geese		10
Pigeons		50

DEPARTMENT OF BOTANY, PLANT PHYSIOLOGY AND PLANT DISEASES

Physiological and Biochemical Aspects of Vegetable Storage

It is a common practice to hold fresh vegetables at low temperatures to retard the processes responsible for the deterioration and spoilage of the product, and there has been much experimentation to determine the storage conditions most suitable for different vegetables, but much less attention has been given to the effect of previous storage temperature on the physiology and keeping qualities of particular vegetables at market temperature.

A comprehensive study was made of the respiratory responses at 22° C. of a number of vegetables after varying periods of storage at 2.5° C. This collection of vegetables included parsnips, carrots, sweet potatoes, turnips, beets and onions. Dahlia roots were also included. Besides the respiratory response after cold storage the drift of the respiratory intensity with the age of the various vegetables was studied. Consideration was also given to the relation of carbohydrates in different vegetables to their respiratory intensity under different conditions, especially after cold storage. The results of this investigation were accepted during the past year for publication in the Journal of Agricultural Research.

The effect of previous cold storage on initial respiratory rate at higher temperature varied considerably with the different vegetables, being very pronounced in Irish potatoes but not even detectable in carrots. The vegetables with a relatively high percentage of starch and in which there was a rapid shifting of the carbohydrate equilibrium with temperature changes were the ones that showed the greatest increase in initial respiratory rate when they were transferred from a low to a higher temperature. The actual respiratory intensity in these vegetables, however, was lower than in most of the other vegetables of the collection studied. There was no direct correlation between the content of either the total or reducing sugars with the respiration rate in the vegetables studied.

The very pronounced "change of temperature effect" on the time rate of respiration in potatoes as measured by the carbon dioxide output was further tested during the past year by determining the oxygen absorbed as measured by the Warburg manometer. As supplemental to this investigation a further study was made of the effect of wound stimulation on the respiration rate in potatoes. It was found that the wound stimulation was much greater in potato pieces that had been cut from potatoes that had been stored at 2.5° C. than in potatoes that had not been subjected to this low temperature. This interesting effect of previous storage temperature on the magnitude of the wound stimulation of the respiration rate of potato "sets" will be further investigated.

PHYSIOLOGICAL AND BIOCHEMICAL STUDIES OF HUBBARD SQUASH DURING STORAGE

Hubbard squash is frequently stored for four or five months and the best storage conditions for this vegetable have been studied by several investigators. A temperature of 40° F. and a relative humidity of 50 to 60 per cent have been generally recommended as the combination of temperature and humidity that will most effectively check losses and deterioration of Hubbard squash during storage. The purpose of the present investigation was a more thorough and extended study of the physiology and biochemistry of this vegetable during storage under the conditions that have been recommended to prevent losses. Attention was especially given to the processes and chemical changes that would affect the culinary and food value of the squash with continued storage. Especial attention was also given to the changes that might make the squash more susceptible to attack of decay organisms as storage continues.

A large amount of analytical work was completed on this problem during the past year but only tentative conclusions are permitted from some of the data on account of the variability in the composition and physiology of individual squashes. For this reason it will be necessary to repeat some of these experiments with a larger number of squashes.

Carbohydrate transformation, especially the hydrolysis of starch, was very rapid during the first month of storage. This was also true of the pectic transformations. Active proteolysis also occurred in both the rind and edible portions during the first month of storage but thereafter there seemed to be no consistent changes in the distribution and amount of the different forms of nitrogen during the remainder of the storage period. Although the content of total nitrogen varied for individual squashes, it was always very low in both the rind and edible portions. The placental tissue was higher in nitrogen than the rest of the squash except the seeds.

Analysis of Alaska Peas That Have Been Separated Into Quality Groups by Means of a Ten Per Cent Brine Solution

During the past year, in cooperation with the Extension Service, an experiment was conducted in methods of grading raw peas. The peas that floated in 10 per cent brine and those that sank were separated and analyzed for the various forms of carbohydrates and nitrogen. The data obtained was reported to the Tri-State Canners' Convention at Philadelphia during December, 1935.

Nitrogen Metabolism in Plants and the Relation of This Metabolism to Important Plant Tissues

Experimental work on this project was begun in October, 1935, and was continued actively until Dr. Stuart resigned, May 15, 1936. A study was made of the nitrogen metabolism in red clover plants during the entire grand period of growth with a view of correlating the nitrogen metabolism with the major inflections in the growth curve. A study was also made of the effect of repeated sprouting on nitrogen metabolism in potato tubers, also the nitrogen metabolism associated with sprout growth in potatoes. The purpose of this study was to determine the nitrogen metabolism associated with active plant growth.

Experimental work on nitrogen metabolism in plants has necessitated a great deal of study of the best methods of determining the different forms of nitrogen in plant tissues. During the past year a paper entitled "The adaptation of the micro-Kjeldahl method for the determination of nitrogen in plant tissues" was published in Plant Physiology 11:173-179, 1936.

Investigation was also made of the stability of nitrogen distribution in water and alcoholic extracts of plant tissues. The experimental work of this study has been completed and a manuscript will be prepared for publication in the near future.

AFTER HARVEST CHANGES IN GREEN SNAP BEANS

The purpose of this investigation, with the results, was published in Bulletin No. 383.

STUDY OF POLYSACCHARIDES IN SWEET CORN

The endosperm of sweet corn, in contrast to that of most varieties of maize, contains a relatively high percentage of soluble polysaccharides, and the culinary quality depends to a large extent on these polysaccharides.

The first part of the investigation of the soluble polysaccharides of sweet corn dealt with the physical and chemical properties. The results of this phase of the study were published in Plant Physiology 10:713-725, 1935, under the title "Physical and Chemical Properties of Soluble Polysaccharides in Sweet Corn." The second phase of this investigation will be concerned with the conditions which influence the ratio of soluble polysaccharides to starch in the endosperm of sweet corn.

PHYSIOLOGY OF COLD HARDINESS IN RED CLOVER

In Bulletin 370, attention was directed to the influence of various physical and chemical changes which take place in red clover roots in the cold hardened condition. During the past year another phase of this investigation was completed and published as Bulletin 391.

Project F-7. Cytogenetic studies in the genera *Ipomoea, Gladiolus and Tulipa.*

This project has as its primary purpose the determination of the relation of the wild species of the three genera to the commercial forms of each. Any attempt to study such a relationship must be made from several angles. At least one of these is chromosome number. In *Gladiolus* there appears to be a rough correlation between the geographical location and type of plant with chromosome number. In *Ipomoea* as well as in *Tulipa,* this does not seem to be a factor, since the chromosome number of the majority of species and varieties is the same. In the latter case chromosome morphology is a much better criterion. The chromosomes of *Ipomoea* are too small for such a study in that genus. Another method of testing relationship is hybridization and then examination of the progeny. This is being carried on in both *Gladiolus* and *Tulipa,* and thus far seems to confirm the fact that both chromosome number and chromosome types are factors in relationship.

Plant Diseases

The main plant disease investigation carried on was the strawberry root disease project. The two important parasites found have been inoculated into strawberry cultures grown with different fertilizers, soil types and methods of treatment. The Fusarium which is found in the outer tissues of the root, varied from 14 to 40 per cent under the different conditions used. The more alkaline media were unfavorable to this fungus. This disease together with several other minor parasites is generally distributed.

The more destructive root parasite which lives in the internal root structures, a phycomycetous fungus, is found locally. It seems to spread from plant to plant, but its habits of life are very difficult to follow under control.

A paper was published on this subject in one of the fruit grower's journals.

The life history of the peachstone fungus, Caryospora, has been followed from ascospore to ascospore, without an intervening conidial stage so far being found. Material for a cytological study of the nuclear processes is being prepared. The unusually large size of the spores is promising toward clearing up some of the sexual life in fungi not seen in the smaller common parasites.

The seasonal and local distribution of this fungus has been partly worked out.

The project on tomato leaf spot development and cytology has been edited for publication.

The investigation of live stock poisoning plants has been planned and preparations made for the survey.

The cooperative spraying project for apple scab has been actively continued with better organization than last year. Some work has also been done on investigating some physiological and cytological problems of the scab fungus.

Tobacco seed bed spraying methods are being tested in cooperation with U. S. D. A. specialists. This and the extensive potato seed maintenance and disease control investigations are giving results of much practical value to the State.

The identification of plants and plant diseases for the information of many inquirers by Dr. Norton is a useful service taking a great deal of time. He also gave some time in aiding the Horticultural Department in establishing the Arboretum and Botanical Garden or Plant Laboratory and in operating the seed exchange with other botanical gardens which is carried on by the Seed Analyst or Inspection Service.

The breeding of a disease resistant strain of canning peas, as outlined in previous reports, is being continued. This work is making substantial progress and giving some promising results.

ENTOMOLOGY

Much work has been done on all of the projects listed. This department in cooperation with the Department of Horticulture and Plant Pathology has been giving much attention to the testing of new spray materials and, in addition to observing their efficiency as insecticides and fungicides, has been making a careful study of their physiological effects on the tree.

Codling Moth.

The codling moth investigations during the summer of 1935 were conducted in an orchard at Frederick. The work was essentially a comparison of two types of arsenate furnished by the Crop Protection Institute for control of codling moth and their effect on foliage and finish of fruit. Fish oil soap was used late in the season to determine its influence on spreading and sticking properties of both types of lead. Another factor considered was the effect of soap as a spreader on arsenic and lead residue removal.

No appreciable difference was observed in the effectiveness of the two types of lead arsenate to control codling moth larvae. The effect of the two leads on fruit and foliage was masked by the extreme drought condition that existed in this orchard from early June until early September. There was such a shortage of moisture that all of the foliage in the orchard was bronzed so badly that it was impossible to differentiate between drought injury and injury that may have been due to spray materials.

The use of fish oil soap as a spreader indicated some interesting points under the conditions of this experiment. On account of the extreme drought conditions there was practically no weathering of spray materials from fruit, and on plots that received two late season sprays against the second-brood codling moth there was a very heavy arsenical and lead residue on the fruit at harvest time, especially so on plots that had soap added to the standard lead arsenate schedule. In some cases the lead residue was more than three times the amount allowed by the Food and Drug Administration. Chemical analyses of fruit from these plots indicated that residue removal was not complicated by the use of fish oil soap as a spreader.

Reports have been prepared and submitted for publication as bulletins on the following projects:

The Corn Earworm—Relation to Varieties of Corn, the use of insecticides, and the response of the moth to sugar.
The Vinegar Gnat.

A mimeographed report has been issued on the use of arsenicals, rotenone and pyrethrum for the control of the Mexican Bean Beetle.

Miscellaneous Insect Studies.

1. Insect parasitism in relation to economic entomology.

Many insect parasites are being reared and used in an attempt to control plant pests. Some that appear promising fail to live up to expectations as the parasite may be only partially adapted to the host and many of the hosts may be able to resist the attack.

(The following problems were assigned to advanced and graduate students.)

2. Comparative study of the labium of the coleopterous larvae.
3. The nutritional requirements of clothes moths.
4. The nutritional requirements of the cheese skipper.
5. Population studies on *Formica exsectoides* (mound building ant).
6. Studies on *Drosophila repleta*, one of the pomace flies.
7. A study of the migratory lepidoptera of the world.
8. A study of the morphology of the head of the Japanese beetle.
9. A record and survey of Brood X of the periodical cicada.

HORTICULTURE

Fruits

During the past five years cultivation of a young apple orchard without the incorporation of cover crops reduced the content of organic matter in a Sassafras gravelly loam nearly 20 per cent, and at the same time greatly increased soil erosion on the gentle slope. On the other hand, discing under annual cover crops increased organic matter and slight or no erosion took place, according to the cover. Cover crops seeded June 1st competed strongly with tree growth, and the young trees were markedly smaller than trees with later covers or no covers. It would appear advisable to keep early cover crops at a distance from young trees, probably at least six feet.

Thinning of Concord grape clusters before blossoming again in 1935 resulted in greatly improved size and compactness of cluster and, in this season, uniform ripening on a given vine in contrast to the uneven ripening of clusters on unthinned vines which also made harvesting difficult.

Peach pruning experiments in 1935 showed definitely that previous pruning treatment and growth responses from such treatments are of great importance in determining the relative amounts of cutting back and thinning that can be done with profit. Thinning cuts should be emphasized when tree growth is dense and vigorous, even though cutting back may seem most logical on upright branches. Cutting back should be emphasized on leggy trees with poor terminal growth. With changes in pruning, together with use of nitrogen fertilizers and borer control, larger peach trees of longer life are resulting. Consequently greater planting distance is necessary. On good soils it has been found that even with 24′ x 24′ distance, trees are becoming crowded at nine years of age. At the greater distances the trees produce much more fruit of better size and quality. With closer planting marketable size was not easily obtained in dry seasons.

Applying the results of shading experiments conducted with individual apple fruits, two weeks before harvest, it is probable that lack of sunny weather prior to harvest is of major importance in reducing *quality* of red color of apples. With a sky overcast with clouds during the day the light intensity is reduced much below that which seems necessary for red color development in apples. Even though area of red color is well developed, the quality of such color practically ceases to improve if shade is placed over the fruit reducing light intensity to 40 per cent of normal.

Spacing of strawberry plants to limit the number of plants per square foot much less than the number in the usual matted row, resulted in increased yield and quality of berries with several varieties that set plants profusely. With some varieties spacing at 11″ apart was definitely better than spacing at 7″ apart. With extreme drouth conditions in the spring of the fruiting year, the spaced plants were much more drouth resistant than plants in the matted rows.

New varieties of fruit under test are being fruited and are of great interest to growers. Lodi, an apple of transparent type and season, looks very promising for Maryland conditions. Cumberland (white) and Valiant (yellow) are two peaches ripening just before and after Carman, respectively, which are hardy and productive of large, attractive fruits for the early season market. Fairfax and Dorsett are two new strawberries, highly productive and excellent quality, especially Fairfax as to quality.

Some new Hale crosses, fruiting in 1936, appear promising to furnish some large, attractive, white peaches of Carman season.

Vegetables

Canning tests with peas have shown Wisconsin Early Sweet the most desirable early pea now sold commercially for the Maryland grower. Superior in canning tests, it has continued to yield almost as well as Alaskas. Newer promising sweets are Mardelah and Wisconsin Penin.

Color studies with the tomato show that color improves for 18 days after the "pink" stage but after the first 9 days spoilage is too great a factor to permit a further ripening in the field to improve color. High temperature effects in preventing red coloration were found to be localized in the part of fruit exposed to such temperatures. However, high temperatures with harvested fruit hastened softening and breaking down of the fruit. Exposed portions of fruits subject to high temperatures in the field showed a higher sugar/acid ratio, indicating more advanced ripening than shaded portions even though color was retarded on the exposed portion.

Three varieties of snap beans under low and high nutrition have shown that greater yields under high nutrition were due to more flowers per plant, greater set of flowers and greater average size of pods.

Cool season crops, including cauliflower, broccoli, Brussels sprouts and lettuce were grown successfully near Oakland, Maryland, and local sales records indicated good profits from such crops.

Of four early varieties of tomatoes, Penn State was earliest but lacked foliage to protect fruits from scalding; Break O' Day also lacked foliage; Scarlet Dawn and Clarks Early appeared worthy for early market use in Maryland.

Cut-off data in canning tests for two years indicate that certain hybrids, notably Stowells Hybrid 14x5, Narrow Grain 26x15 and Country Gentlemen 9x24, do not cut ofl as much corn per ton of ears in the husks as do corresponding open-pollinated varieties. Larger cobs, more husks and shallowness of kernel are contributing factors in giving the lower cut-off.

Mulching of rhubarb with a soy bean mulch gave a great advantage in growth and yield.

Application of 500 pounds of cyanamid per acre in the fall (December 1) increased yield of peas appreciably and possibly reduced the extent of root rot. Residual effects on yields of following crops of lima beans and wheat were noted.

A winter hardy strain of Virginia Savoy has been selected during the past few years and in the past winter this strain showed a high degree of resistance to winter injury, compared with our known American varieties.

Breeding work with tomatoes and with potatoes is giving some promising hybrids and selections.

FLOWERS

Rust resistant snap-dragons from California showed resistance in trials in Maryland. Some new F-1 crosses have produced some good colors for commercial purposes.

In testing varieties of sweet peas, it was noted that some varieties dropped their buds in dull weather more than other varieties.

Two varieties of gladiolus of the Herald strain from Holland, planted in October, bloomed in February.

PLANT PROPAGATION

Forty apple varieties propagated by trench-layering to produce self-rooted trees, showed large differences in type and extent of root development among the several varieties after three years in the nursery row. Thus it becomes apparent that in the development and selection of better stocks for apple trees, a knowledge of inherent rooting behavior of clons under various environments becomes essential.

POULTRY

The interest of Station workers in poultry may be gained from the fact that four different departments issued five bulletins this year relating to this industry. The poultry department has another bulletin ready for press and several others in preparation. Many minor problems have received attention which have not been set up as regular projects and which have not advanced to a point where conclusions may be drawn.

Inheritance of Disease Resistance.

Evidence is gradually being accumulated at this and other stations which indicates that resistance to specific diseases of poultry can be built up in certain strains and become definitely inherited. The Maryland Station has been carrying on a project for several years on "Breeding for Resistance to Pullorum Disease." The eighth generation has been reared of a flock of Rhode Island Reds which originated from a group of birds made up from the reactors of two breeders who had their flocks blood tested. Professor Waite makes the following statement regarding this project: "It became evident, almost from the start, that hereditary resistance was an important factor in the control of this disease, and our efforts have been extended to a study of the mechanism of this inheritance. With each succeeding generation we have become more convinced that resistance is inherited, and that highly immune flocks may be bred. There is little room for doubt that the disease can be easily controlled by good management.

"I think that the poultrymen in general are beginning to recognize the hereditary tendencies involved in this disease. We hear the occasional complaint that flocks that have been freed from the disease, by means of the agglutination test, tend to produce chicks that readily contract the disease, if and when they come in contact with it. This would seem to be an indication that resistance is being bred out, and it all would seem to be in accordance with the laws of nature in connection with natural selection and the survival of the fittest. For a long time it has seemed that we are crossing up nature when we make use of the agglutination test for culling our flocks and eliminating the pullorum reactors. Apparently what we are doing is to sacrifice future security for a present gain. The average person looks more particularly to his immediate needs, and his immediate pleasures. It is difficult to get him to look ahead, to do things for the betterment of the future generations. No one has yet been able to tell us what it is that we test for when we determine that a bird is a reactor. Until we know definitely otherwise, I think it logical to assume that the reactor is a bird that has, or is demonstrating, an ability to fight off and control the disease. She certainly is harboring the disease in her system if the test is accurate, and she surely is alive or no one would think of applying the test. No one can possibly question this logic. Then to go another step in our reasoning, if she is living, and if she has the disease, she surely is demonstrating some degree of natural control. The two questions that we are interested in are: Is this ability inherited? And, if so, in what manner?"

SEED INSPECTION AND RESEARCH

The work of this service has resulted in a better appreciation of the value of good seed. This has brought to the Seed Laboratory an increasing number of samples for testing and a demand for general information regarding the character of seed.

In order for seed inspection to be up to date and to meet all the demands and supply the information desired by farmers and the seed trade, it is very necessary to conduct research on new problems.

This department has worked out some new ideas on the economic use of seeds and is now making inspection reports to farmers on the basis of the number of plants that can be expected from seed of a given quality. In practice, this is more definite and means much more than a simple statement of per cent purity and germination. The practical results with many crops depends upon the variety and source of the seed. This is a question in seed testing that will require much consideration.

The Seed Department has been more or less crippled by the reduction of the State appropriation for its work. It needs more money for maintenance, the staff should be increased and better laboratories and equipment provided if the increasing demands for testing are to be met and the new problems investigated.

SEED INSPECTION

During the twelve-month period ending June 30, 1936, seed dealers and seed users have submitted 2,781 samples to the laboratory. This is the largest number that has ever been submitted to the laboratory during any twelve-month period. This work has been particularly heavy in recent months. For the six-month period ending April 30, 1936, 2,184 samples have been submitted to us, and for the first six months of the present calendar year the number has been 2,025. These are the largest numbers ever submitted to the laboratory during like periods.

This steady increase in the number of samples submitted is the best possible evidence that farmers and other seed users are realizing the importance of knowing the planting value of the seeds they intend to use. If it had been possible to get the results out more promptly the number of samples submitted to the laboratory (particularly by the dealers who pay for analytical work) would undoubtedly have been much larger. It is most unfortunate that the staff has been reduced and that more and prompter service can not be rendered.

The seed testing department has continued to give much attention to the character and the form of the information supplied farmers who submit samples for an appraisal of their planting value. There is an unusual opportunity to make seed analyses, examinations, and tests of greater practical value by making reports more specific and more understandable than they have been in the past. In this connection, it might be profitable and desirable to undertake a rather extensive educational campaign if facilities were available for such work.

Although Maryland is the thirty-sixth state in the area of land available for crops, it was the sixth state in the production of red clover seed last year. Maryland red clover seed is particularly well adapted to use in this section because of its adaptability due to disease resistance. Furthermore, from premilinary studies, it appears that Maryland red clover seed is considerably below average in size of "berry." If further work over a period of years proves this to be the case, the amount of Maryland red clover seed required for planting a unit area will be less than the amount required from other sources. With these two very advantageous qualities properly emphasized, it may be desirable to promote the production of Maryland red clover seed to such an extent that it will become of major importance to a properly diversified and balanced agriculture in the State. Unfortunately, the percentage of weed seeds in Maryland red clover is quite high. Definite steps should be taken to encourage the production of seeds which do not carry a high weed seed content, and such crop rotations and farm practices as will lessen the weed seed content of our red clover seed should be advocated.

The laboratory has continued to accumulate duplicate germination test data as a by-product of the regular work. There has been assembled sufficient data, for a few kinds of the most largely used seeds, to furnish dependable information as to the extent of the variation to be expected between duplicate tests. This information, which has never before been available, should be very helpful to seed analysts, inasmuch as tolerances are now based on very few actual data. The publication of this material would be rather expensive because of it being almost wholly tabular in form. It is hoped, however, that this work will be continued until it covers representative kinds of seeds in the different groups which are of interest to seed analysts.

TOBACCO INVESTIGATIONS

The work on tobacco production as outlined in the Forty-eighth Annual Report has been continued in cooperation with the U. S. Department of Agriculture. During the year there has been published a bulletin, No. 382, on the Production, Marketing and Consumption of Maryland Tobacco, which was the result of work done by the Department of Agricultural Economics.

FINANCES

Resources, Receipts and Expenditures

The research work is maintained largely by State and Federal appropriations. The State appropriations were cut 40 per cent with the fiscal year beginning October, 1933, and then cut another five per cent for the fiscal year beginning October, 1935. This reduction has made it necessary to curtail some activities, circumscribe all and made it impossible to expand to meet new problems and demands. There has been almost nothing available for repairs of buildings and the replacement of worn and obsolete apparatus and machinery. It is very necessary that the State appropriations be increased not only to restore the reductions but also to provide facilities for many new lines of research. It is expected that the State will provide funds for land, buildings, repairs, general labor, operating, maintenance and executive expenses and also to supplement the Federal appropriations. See list of needs on page v which the State should provide at once.

Federal appropriations are made under the provisions of the laws known as the Hatch, Adams, Purnell and Bankhead-Jones Acts. These Acts outline the nature and kinds of research to be conducted and make some restrictions as to the expenditures. The Bankhead-Jones Act was passed in 1935. The appropriations under this Act makes allotments to the States for research work on the basis of the rural population. Maryland received for the fiscal year July 1, 1935, to June 30, 1936, $7,137.62. This will be increased a like amount each year for five years. This Act requires the State to provide and expend at least an equal sum each year for agricultural research.

The following financial statements give the details as to the receipts and expenditures for the fiscal year covered by this report:

MARYLAND AGRICULTURE EXPERMIENT STATION IN ACCOUNT WITH RECEIPT FUNDS

Dr.	Station Farm	Otten Farm	Dairy Inspection
Balance June 30, 1935	$5,053.47		—$238.35
Receipts for the year 1935-1936	21,221.68	$4,000.00	4,406.06
Totals	$26,275.15	$4,000.00	$4,167.71
Cr.			
By Salaries	$71.51		$1,199.97
Labor	6,904.91	415.50	374.61
Stationery and Office Supplies	67.53		354.30
Scientific Supplies	255.17		5.25
Feeding Stuffs	5,349.33	287.61	
Sundry Supplies	1,389.17	66.03	34.33
Fertilizers	108.75	71.75	
Communication Service	4.25	8.80	120.00
Travel Expense	1,017.04	13.81	849.41
Transportation of Things	738.45		
Publications	436.47		
Heat, Light, Water and Power	252.68		
Furniture, Furnishings and Fixtures			50.01
Library	2.00		
Scientific Equipment	17.61		
Live Stock	282.75	600.00	
Tools, Machinery and Appliances	1,816.21	167.66	
Buildings and Land	27.00	386.00	
Contingent	192.83		10.00
Totals	$18,933.66	$2,017.16	$2,997.88
Credit Balance—June 30, 1936	7,341.49	1,982.84	1,169.83
Totals	$26,275.15	$4,000.00	$4,167.71

MARYLAND AGRICULTURAL EXPERIMENT STATION IN ACCOUNT WITH UNITED STATES APPROPRIATIONS.

Dr.	Hatch Fund	Adams Fund	Purnell Fund	Bankhead Jones Fund
To appropriations for Fiscal year 1935-1936	$15,000.00	$15,000.00	$60,000.00	$7,137.62
Cr.				
By Salaries	$12,740.49	$13,497.76	$44,333.37	$3,682.36
Labor	1,499.90	216.00	4,045.86	258.45
Stationery and Office Supplies			105.98	58.30
Scientific Supplies	116.37	327.61	1,767.73	191.98
Feeding Stuffs				
Sundry Supplies		16.66	530.45	56.54
Fertilizers			703.19	99.45
Communication Service	22.36	57.61	8.61	
Travel	51.07	92.95	3,339.75	463.95
Transportation of Things			76.98	
Publications	569.81		2,790.26	
Heat, Light, Water and Power				
Furniture, Furnishings and Fixtures		94.50	120.03	
Library			37.13	
Scientific Equipment		676.83	278.47	154.81
Tools, Machinery and Appliances		20.08	765.49	711.78
Repairs			51.29	
Live Stock			774.61	
Buildings and Land			270.80	1,460.00
Contingent				
Totals	$15,000.00	$15,000.00	$60,000.00	$7,137.62

MARYLAND AGRICULTURAL EXPERIMENT STATION IN ACCOUNT WITH THE STATE APPROPRIATIONS.

Dr.	Research Fund	Ridgely Farm	Biological Lab.	Seed Inspection
Balance June 30, 1935	$12,416.68	$1,485.17	$2,287.19	$1,467.00
Receipts for year 1935-1936	40,179.00	2,962.54	8,026.62	6,076.00
Totals	$52,595.68	$4,447.71	$10,313.81	$7,543.00
Cr.				
By Salaries	$16,910.48	$1,500.00	$4,267.51	$5,680.00
Labor	10,505.69	1,286.18	1,576.70	
Stationery and Office Supplies	224.57		92.44	93.82
Scientific Supplies	818.97	13.95	432.38	10.25
Feeding Stuffs	3,080.31	37.40	24.85	
Sundry Supplies	1,034.00	95.90	1,005.72	103.27
Fertilizer	904.62	107.71		
Communication Service	498.09	38.97	160.39	132.63
Travel Expense	808.71	196.50	9.84	
Transportation of Things	552.28	1.96	319.83	
Publications	870.38			
Heat, Light, Water and Power	2,476.09		335.77	
Furniture, Furnishings, etc.	3.30		85.00	
Library	242.42			10.24
Scientific Equipment	432.58		17.50	4.50
Live Stock			47.25	
Tools, Machinery and Appliances	1,024.23	19.04	40.68	
Buildings and Land	2,120.90	313.03	4.87	58.75
Contingent	2,858.87		123.77	10.00
Totals	$45,366.49	$3,610.64	$8,544.50	$6,103.46
Credit Balance—June 30, 1936	7,229.19	837.07	1,769.31	1,439.54
Totals	$52,595.68	$4,447.71	$10,313.81	$7,543.00